Lindsay States

Practice solving for one variable (what you do to one side you have to do to the other)

Intended grade levels: 9th/Pre-Algebra

**Rationale:** In this lesson, students will be able to increase proficiency in balancing equations and solving for one variable, especially regarding the importance of completing all steps to BOTH sides of an equation. Students will be using a visual aid, specifically a see-saw, so see how completing an operation to both sides allows the equation to remain balanced (so that the integrity of the equation is maintained). Students must first visually represent the equation, and only after the equation is correct will students move to solving the equation. Students need to learn proficiency in how to balance and solve equations. Many students in my school (whom I have tutored) forget that not doing the same operation to both sides will not allow them to solve the equation (sometimes taking numbers away/adding them willy-nilly). Through this practice, students will become more systematic in their work with equations which will assist them in solving equations of greater difficulty. Reinforcing this concept/skill (balancing) in this lesson will assist students to gain proficiency. Also, offering a visual way of looking at this concept can help students broaden their understanding of the concept. This lesson will lead into balancing equations with negative numbers, and then into balancing equations with more than one variable.

**Standard(s):** A1.2.B Recognize the multiple uses of variables, **determine all possible values of variables that satisfy prescribed conditions**, and **evaluate algebraic expressions** that involve variables.

**Technology:** The Source (website that has our class website which will have the link to the activity). Activity Website:

<http://nlvm.usu.edu/en/nav/frames_asid_201_g_4_t_2.html?open=instructions&from=category_g_4_t_2.html>. Activity: “Algebra Balance Scales.”

**Lesson Plan:**

-Students will meet in the Computer Lab

-Introductory Activity-Think/Pair/Share responding to the following prompt: “Why, when you do something to one side of an equation, do you have to do it to the other side?” This activity will quickly determine what misconceptions students still have, and briefly allow them to see others’ reasons for WHY an equation must be balanced.

-Teacher will remind students why balancing equations is necessary (this will have been taught/practiced in earlier lessons)

-Teacher will show students how to navigate to the class webpage, and where to find the link to the activity.

-Teacher will explain how the activity works, and model going through 1 equation (creating the visual representation of the equation, and then solving it). As teacher models, teacher will also be “thinking aloud” the thought process of trial and error for students to see so that they too can practice trial and error.

-Teacher will have a student volunteer do the next equation, also “thinking aloud” so that students can see another person’s thought process. If the volunteer is struggling, teacher will ask for other students’ ideas/techniques in how to attack the activity, creating a collaborative opportunity for the class, and to allow other students to act as experts, instilling confidence in other students.

-Students will work to complete 2 “Balance Scales” puzzles, having the teacher check off each time they are “correct.” The website seems to generate different puzzles each time, so students will not be working on the same puzzles and will not be able to copy off each other (allowing authentic individual assessment).

*They will need to write down the following in their notebooks to turn in:*

*1) Initial equation*

*2) Sketch of their balanced equation*

*3) Each step they make to solve the equation (e.g. “Add 4 to each side)*

*4) Their final solution.*

-Once students have completed 2 “Balance Scales,” they will work to create their own equation (the site will not allow students to create equations that have non-integer answers). For this part of the activity, they will need to be assessed a) if the equation works, and b) if they can solve it. *Again, they will need to write down the following in their notebooks to turn in:*

*1) Initial equation*

*2) Sketch of their balanced equation*

*3) Each step they make to solve the equation (e.g. “Add 4 to each side)*

*4) Their final solution.*

**Assessment:** The informal assessment is that students will complete 2 “Balance Scales,” show what steps they went through for each equation, and then create their own equation. During class I will be circulating the lab to check off students after each puzzle (which says “correct”), but more importantly to assist students in need. After class I will look at their notebooks to assess where students seem to be having problems in the process to determine what I need to re-teach/reinforce. The assessment is very quick, so whether students understand the activity in class will become clear very quickly.

**Special Needs:** For students with exceptional needs, I will create the problem for them on the screen, making it as basic as possible to start, and then giving them successively more difficult equations.

**Modification for substitute:** Since substitutes are not allowed to take students to the computer lab, I would change the lesson plan so that the sub would model how to do the problems on the classroom workstation, and then have students complete the puzzles on notebook paper to turn in at the end of class.